The Influence of Shortening on Clinical Outcome in Healed, Displaced, Midshaft Clavicle Fractures After Nonoperative Treatment

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Purpose: Radiographic malunion is always seen following nonoperative treatment of displaced midshaft clavicular fractures; however, the implications on clinical outcome remain unclear. We aimed to evaluate the effect of clavicular shortening, measured by 3-dimensional computed tomography (3DCT), on functional outcomes and satisfaction in patients with healed, displaced, midshaft clavicle fractures up to 1 year following injury.

Methods: The data used in this study were collected as part of a multicenter, prospective randomized control trial comparing open reduction and plate fixation with nonoperative treatment for acute displaced midshaft clavicle factures. Patients who were randomized to nonoperative treatment and who had healed by 1 year were included in the present study. Shortening relative to the uninjured contralateral clavicle was measured on 3DCT. A standardized protocol for measuring clavicle length was followed. The uninjured side served as a control and was deemed to have a relative length of 100%. The proportional shortening was measured as follows: PS, proportional shortening; FS, fractured side; US, uninjured side; PS [%] = [(US – FS)/US] × 100. Outcome analysis was conducted at 6 weeks, 3 months, 6 months, and 1 year following injury and included the Disabilities of the Arm, Shoulder and Hand (DASH), Constant, and Short Form-12 (SF-12) scores, and patient satisfaction.

Results: 48 patients with displaced midshaft clavicle fractures who healed following nonoperative treatment and who had a 3DCT scan that included the whole length of both clavicles were included. The mean shortening of injured clavicles, relative to the contralateral side, was 11.3 mm (±7.6 mm) with a mean proportional shortening of 8%. Proportional shortening did not significantly correlate with the DASH ($P > 0.42$), Constant ($P > 0.32$) or SF-12 ($P > 0.08$) scores at any point during follow-up. There was no significant difference in the mean DASH or Constant scores at any follow-up time point both when the cut-off for shortening was defined as 1 cm ($P > 0.11$) or 2 cm ($P > 0.35$). There was no significant difference in clavicle shortening between satisfied and unsatisfied patients ($P > 0.49$).

Conclusion: The present study demonstrated no association between shortening and functional outcome or satisfaction in patients with healed, displaced, midshaft clavicle fractures up to 1 year following injury.